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**LITTLE COLORADO RIVER FISH MONITORING  
2002 ANNUAL REPORT**

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## INTRODUCTION

The Little Colorado River (LCR) is the primary spawning site for endangered humpback chub (*Gila cypha*) in the Colorado River Ecosystem (CRE), Grand Canyon, and the only known population aggregate from which fish are recruited into the CRE adult population (Valdez and Ryel 1995; Coggins and Walters 2001). Native fishes, bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), and speckled dace (*Rhinichthys osculus*) also spawn in the LCR (Robinson et al. 1998) as do exotic species including channel catfish (*Ictalurus punctatus*), fathead minnow (*Pimephales pimelodus*), red shiner (*Cyprinella lutrensis*), and common carp (*Cyprinus carpio*).

In 1987, Arizona Game and Fish Department (AGFD) began a monitoring program in the LCR to assess the status and trends of humpback chub (Robinson and Clarkson 1992). Annual standardized hoopnet sampling was conducted for 30 – 40 days in the spring in an attempt to capture humpback chub during their spawning period. The program was discontinued in 1999 but was reinstated in 2002 at the advice of the Grand Canyon Monitoring and Research Center Protocol Evaluation Panel (Anders et al. 2001). Catch-per-unit-effort (CPE) indices derived from the monitoring program have proven to be useful as independent validation for mark-recapture population models developed by Coggins and Walters (2001). With the exception of the period 1999-2001, the sampling program represents one of the longest-term sampling methods in use in Grand Canyon fisheries studies.

## STUDY SITE

The study site consisted of the lower LCR, 1200 m upstream from its confluence with the Colorado River. The LCR in the study area has a channel that is often deeply entrenched in a vertical-walled canyon that in places narrows to less than 50 m. The LCR channel varies from deep pools and runs to riffles and small rapids. Substrates are primarily silt and sand littered with large boulders.

## METHODS

Thirteen standardized AGFD hoop net sites in the lower 1200 m were sampled daily between 19 April and 19 May 2002. Standard nets measured 6.3 mm mesh, 5-m long, 1.0 m diameter. Nets were set at 100, 119, 137, 165, 420, 480, 500, 577, 675, 1045, 1110, 1160, and 1195 m upstream from the confluence. Net locations were set as close as feasible to those used in previous sampling efforts (Brouder and Hoffnagle 1998). Catch per unit effort was calculated as number of fish caught / 24 h.

Large mesh hoop nets were also set upstream from the study site in an effort to capture large bodied exotic channel catfish and common carp. Results of those sampling efforts will be reported separately.

All fish collected were handled following protocols in Ward (2002). All fish collected were identified to species and measured for total length (TL; mm). Fork length was also collected for humpback chub, flannelmouth sucker, and bluehead sucker. Weights were not obtained because field scales did not operate in high winds common during the study period.

Native fish were sexed when possible based on extrudable gametes, and sexual condition (not ripe, ripe, spent) and sexual characteristics (none, color, tuberculate) were noted. Number and type of external parasites were recorded. Native fish  $\geq 100$  mm TL were scanned for the presence of a PIT tag. If a PIT tag was not found, and the fish was  $\geq 150$  mm TL, one was inserted into the fish. Tag presence (R) or absence (M) and PIT tag number were recorded. Fish were also checked for possible fin clips (dorsal punches) used by the U.S. Fish and Wildlife Service as a secondary tag mark during their April 8 – 19, 2002 sampling efforts. PIT scanner information was downloaded to electronic files for later data validation.

## RESULTS

A total of 2,163 fish representing 12 species was captured in the LCR during standardized monitoring in 2002 (Table 1). Native species dominated the catches, and comprised more than 90% of total fish caught (Figure 1). Catch rates of native fishes were generally higher than those seen during the previous two years of sampling efforts (1997-98) (Tables 3). Speckled dace, flannelmouth sucker, and humpback chub were the predominant species caught.

The LCR was at base flow of approximately 222 cfs (Robinson et al. 1998) during the entire sampling period, turbidity was less than 10 NTU's, and temperature ranged from 15 – 22 C (Figures 4-7).

### Native species

#### *Bluehead sucker*

Bluehead sucker caught in 2002 had a mean total length of 96 mm, and ranged in size from 28 to 332 mm. Bluehead sucker were primarily comprised of fish presumed to be Age I (Figure 2). A total of 67 bluehead suckers were scanned for presence of a PIT tag, only one was a recaptured PIT tag (Table 13). This individual fish was tagged and recaptured during our 2002 sampling efforts. No bluehead sucker tagged during previous sampling efforts were recaptured.

Twelve ripe male bluehead suckers were collected between 22 April and 8 May (Table 7). No ripe females were recorded, and young-of-the-year ( $< 50$  mm) bluehead sucker were common in catches (Figure 2, Table 5). Evidently bluehead sucker spawned prior to our sampling. The USFWS reported capturing ripe male and female bluehead sucker during their April 8 – 19 trip.

A single bluehead sucker had a single *Lernea*.

#### *Flannelmouth sucker*

Flannelmouth sucker caught in 2002 had a mean length of 174 mm and ranged in size from 14 to 574 mm total length. Most flannelmouth suckers were presumed to be primarily Age I fish, but many may have been Age 0 fish spawned early in the spring (Table 5, Figure 2). A total of 216 flannelmouth suckers were scanned for the presence of a PIT tag, and 73 (34%) were recaptured fish (Table 11). No ripe flannelmouth suckers were captured, four fish were

tuberculate and four fish were recorded “with color” (Tables 7, 9). The USFWS reported capturing only three ripe male flannelmouth suckers during their April 8 – 19 trip. Based on appearance of adult flannelmouth sucker and the abundance of small (50-60 mm fish) we assumed that flannelmouth sucker had spawned the previous fall or early in the spring.

One FMS had *Lernea* and one was recorded as having fungus.

#### *Humpback chub*

A total of 430 humpback chub were collected in standardized hoop net sets during the spring monitoring period. The majority of the fish were juveniles (< 150 mm TL), and most were probably from the 2000 and 2001 year classes (Table 5, Figure 2). Large chub appeared to be mostly spent adults; many had frayed lower caudal fin lobes.

We examined 207 humpback chub  $\geq$  100 mm TL for the presence of a PIT tag; 16 had tags. We examined 78 humpback chub  $\geq$  150 mm TL for presence of a PIT tag, 45 had tags. We also noted two fish with apparent PIT tag scars but no PIT tag was present. The majority of fish that had been previously PIT tagged and handled more than twice (13/22) were mainstem fish, probably returning to the main Colorado River after spawning (Table 12).

Young-of-the-year chub were very uncommon in catches. A single chub < 50 mm TL was collected on 1 May 2002. A single ripe female chub was recorded (140 mm TL), but the eggs that extruded from the fish were small and green in color. Eight HBC were recorded “with color” (Table 8). The USFWS reported ripe male and female HBC in their catches during their April 8 – 19 trip, indicating that HBC had just spawned. We also recorded four adult HBC with worn lower caudal fins suggesting recent spawning activity.

Ten HBC had *Lernea*, nine of the chub had a single *Lernea* and one fish had two *Lernea*. Average total length of HBC with *Lernea* was 146.5 mm.

#### **Nonnative species**

##### *Fathead minnow*

Adult fathead minnow 50 – 100 mm were relatively common in catches and fish were nearing spawning. Eighteen ripe females and 16 ripe or tuberculate males were collected.

##### *Other species*

A single ripe female plains killifish was collected. Other nonnative species were collected including black bullhead, yellow bullhead, channel catfish, common carp, rainbow trout, and red shiner.

Stomachs from 19 large bodied predators were examined (Table 4). Eleven stomachs were empty; humpback chub was detected in one stomach, four stomachs contained unidentified fish remains, three stomachs contained invertebrates, and one stomach contained vegetation.

## **SUMMARY**

Mean CPUEs of native fishes during 2002 were higher than seen during 1997 and 1998, which was encouraging. High catch rates of humpback chub were comprised largely of fish

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from the 2000 and 2001 cohorts and reflected the lack of a substantial flow event in the LCR since 2000. Most of the sucker species were Age-0 fish either from an early spring spawn or possibly a fall spawn during 2001. Densities of fathead minnow and killifish were relatively low, although they had just started spawning during our sampling.

Standardized monitoring should be continued to compare catch rate data with that collected by USFWS and population estimates from GCMRC to use in long term monitoring.

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Table 1. Catch by species, lower 1200 m hoop net monitoring, Little Colorado River, April 19-May 19, 2002. Total effort = 9057 net hours

Species	Catch	%
Bluehead sucker	299	13.8%
Flannelmouth sucker	540	25.0%
Humpback chub	430	19.9%
Speckled dace	763	35.3%
<b>Total Native</b>	<b>2032</b>	<b>93.9%</b>
Black bullhead	3	0.1%
Channel catfish	9	0.4%
Common carp	2	0.1%
Fathead minnow	92	4.3%
Plains killifish	4	0.2%
Rainbow trout	5	0.2%
Red shiner	14	0.6%
Yellow bullhead	2	0.1%
<b>Total Non-native</b>	<b>131</b>	<b>6.1%</b>
<b>Total</b>	<b>2163</b>	<b>100.0%</b>

Table 2. Catch of species by year, LCR standardized hoop net monitoring 1987 – 2002.

YEAR	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2002	Total
BBH														1
BHS	44	84	120	37	148	91	44	64	32	760	50	31	299	1804
CCF	7	9	53	10	8	18		5	1	2	12	5	9	139
CRP	2	1			1			1	49	65		2	121	
FHM		12	19	10	8	8	1	265	19	482	789	52	92	1757
FMS	52	136	51	47	168	124	50	88	65	257	101	10	540	1689
HBC	415	858	845	612	730	863	431	657	243	462	132	140	430	6818
PKF					1					8	107	1	4	121
RBT			1		4	1	2		1	10	1	4	5	29
RDS			2											2
RSH									25	84	8	14	131	
SPD	136	255	255	126	1647	1227	455	1022	488	1077	434	110	763	7995
SUC				2			1			2				5
UID		1				1	13	1						16
YBH					1				1		1			3
	656	1356	1346	844	2714	2335	997	2102	851	3134	1776	362	2158	20631

Table 3. Catch/24 hours of hoop net effort by year, LCR standardized hoop net monitoring 1987-2002.

Species	Year												
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2002
Bluehead sucker	0.82	0.48	0.85	0.17	0.26	0.16	0.11	0.16	0.08	1.64	0.10	0.09	0.41
Channel catfish	0.14	0.05	0.38	0.05	0.01	0.03	0.00	0.01	0.00	0.00	0.03	0.02	0.01
Common carp	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.14	0.00	0.00
Fathead minnow	0.00	0.07	0.13	0.09	0.01	0.01	0.00	0.67	0.05	0.91	1.84	0.14	0.13
Flannelmouth sucker	0.85	0.73	0.36	0.22	0.26	0.21	0.12	0.20	0.17	0.37	0.22	0.03	0.75
Humpback chub	7.99	4.73	5.98	3.01	1.23	1.54	1.11	1.66	0.61	0.87	0.31	0.41	0.60
Plains killifish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.25	0.00	0.01
Rainbow trout	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.01	0.01
Redside shiner	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Red shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.20	0.02	0.02
Speckled dace	2.45	1.61	1.81	0.71	3.09	2.00	1.33	2.65	1.27	2.63	1.00	0.29	1.05

Table 4. Catch of predators (black bullhead = BBH, channel catfish = CCF, rainbow trout = RBT, yellow bullhead= YBH) and stomach contents.

Gear	Rmile	Species	Total	Comments
			Length	
GFH	420	BBH	169	STOMACH EMPTY
GFH	420	BBH	172	STOMACH EMPTY
GFH	100	BBH	221	STOMACH EMPTY
GFH	100	CCF	170	STOMACH EMPTY
GFH	1110	CCF	215	EMPTY STOMACH
GFH	1195	CCF	260	FISH IN GUT SPECKLED DACE 60MM, 50, 50 SUCKER 43MM
GFH	675	CCF	335	STOMACH EMPTY
GFH	480	CCF	352	2 VERY DIGESTED FISH
GFH	480	CCF	390	EMPTY
GFH	675	CCF	415	STOMACH EMPTY
GFH	420	CCF	425	EMPTY
GFH	1195	CCF	524	VEG IN STOMACH
GFH	480	RBT	295	EMPTY STOMACH
GFH	1110	RBT	314	UNIDENTIFIED FISH IN GUT
GFH	675	RBT	333	SIMULIDS-STOMACH
GFH	165	RBT	356	HBC, TL = 102 SPD, TL=63 IN STOMACH
GFH	119	RBT	378	CHIRONOMIDS
GFH	100	YBH	220	EMPTY STOMACH
GFH	100	YBH	243	TERRESTRIAL INVERTEBRATES

Table 5. Length frequency distributions of fish collected in standardized hoop net monitoring, April 19 – May 19, 2002.

	SPECIES											
	BBH	BHS	CCF	CRP	FHM	FMS	HBC	PKF	RBT	RSH	SPD	YBH
10 - 19						2						
20 - 29		2				6					2	
30 - 39		29		1		11	1				18	
40 - 49		21		1		48		1			32	
50 - 59		42			16	115		3		9	117	
60 - 69		76			40	43				4	199	
70 - 79		39			32	20	5			1	231	
80 - 89		16			4	12	17				92	
90 - 99		1				20	56				37	
100 - 109		1				13	94				27	
110 - 119		3				11	87				7	
120 - 129						11	52					
130 - 139						5	23					
140 - 149						7	14					
150 - 159						6	10					
160 - 169	1	1				7	8					
170 - 179	1	5	1			6	5				1	
180 - 189						7	1					
190 - 199		11				9	6					
200 - 209		6				8	1					
210 - 219		9	1			10	3					
220 - 229	1	6				12	2					1
230 - 239		6				14	3					
240 - 249		4				10	1					1
250 - 259		3				6	1					
260 - 269		2	1			1						
270 - 279		3				3	1					
280 - 289		1				4	1					
290 - 299		1				5	1			1		
300 - 309		2										
310 - 319							2		1			
320 - 329		1				1						
330 - 339		1	1			1				1		
340 - 349						1	2					
350 - 359				1		1	3			1		
360 - 369							4					
370 - 379						1	2			1		
380 - 389						4	7					
390 - 399			1			4	5					

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	SPECIES											
	BBH	BHS	CCF	CRP	FHM	FMS	HBC	PKF	RBT	RSH	SPD	YBH
400 - 409						8	5					
410 - 419			1			2	1					
420 - 429			1			7	1					
430 - 439						5	2					
440 - 449						6						
450 - 459						11						
460 - 469						7						
470 - 479						9						
480 - 489						12						
490 - 499						5						
500 - 509						6						
510 - 519						3						
520 - 529			1			7						
530 - 539						3						
540 - 549						1						
550 - 559						1						
560 - 569						1						
570 - 579												

Table 6. Mean total length (mm) of fish collected by standard monitoring nets (GFH) and 2-inch hoop nets (HM2), LCR 2002.

SPECIES	GEARTYPE	Mean	N	Std. Deviation	Minimum	Maximum	Range
BBH	GFH	187.3333	3	29.19475	169.00	221.00	52.00
	Total	187.3333	3	29.19475	169.00	221.00	52.00
BHS	GFH	96.3859	298	70.99771	28.00	332.00	304.00
	Total	96.3859	298	70.99771	28.00	332.00	304.00
CCF	GFH	342.8889	9	111.92904	170.00	524.00	354.00
	HM2	588.1000	10	100.69144	470.00	740.00	270.00
CRP	Total	471.9474	19	162.66751	170.00	740.00	570.00
	GFH	36.5000	2	4.94975	33.00	40.00	7.00
	HM2	417.5000	2	17.67767	405.00	430.00	25.00
FHM	Total	227.0000	4	220.22564	33.00	430.00	397.00
	GFH	66.5870	92	7.48060	52.00	85.00	33.00
	Total	66.5870	92	7.48060	52.00	85.00	33.00
FMS	GFH	174.4712	539	156.34215	14.00	574.00	560.00
	HM2	477.0000	1	.	477.00	477.00	.00
	Total	175.0315	540	156.73866	14.00	574.00	560.00
HBC	GFH	140.0141	427	77.79270	35.00	436.00	401.00
	Total	140.0141	427	77.79270	35.00	436.00	401.00
PKF	GFH	53.2500	4	4.42531	49.00	58.00	9.00
	Total	53.2500	4	4.42531	49.00	58.00	9.00
RBT	GFH	335.2000	5	32.91960	295.00	378.00	83.00
	Total	335.2000	5	32.91960	295.00	378.00	83.00
RSH	GFH	58.2143	14	6.98546	50.00	75.00	25.00
	Total	58.2143	14	6.98546	50.00	75.00	25.00
SPD	GFH	69.5531	763	15.22451	24.00	171.00	147.00
	Total	69.5531	763	15.22451	24.00	171.00	147.00
YBH	GFH	231.5000	2	16.26346	220.00	243.00	23.00
	Total	231.5000	2	16.26346	220.00	243.00	23.00
Total	GFH	115.2141	2158	101.92391	14.00	574.00	560.00
	HM2	553.3077	13	110.44485	405.00	740.00	335.00
	Total	117.8374	2171	107.40859	14.00	740.00	726.00

Table 7. Sexual condition fish collected by all gear types, LCR 2002.

SPECIES	SEX											
	Female		Male		Undetermined							
	SEXUAL CONDITION			SEXUAL CONDITION			SEXUAL CONDITION			SEXUAL CONDITION		
	Not ripe	Ripe	Spent	Not ripe	Ripe	Spent	Not ripe	Ripe	Spent	Not ripe	Ripe	Spent
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
Black bullhead				1	2	12	2					2
Bluehead sucker				8	3	1	4					283
Channel catfish												3
Common carp												3
Fathead minnow				18	1	1	14					58
Flannelmouth sucker					2		3					536
Humpback chub					1	9	9					410
Plains killifish												3
Rainbow trout												2
Red shiner												13
Speckled dace												13
Yellow bullhead												2
												759

Table 8. Sexual characteristics of fishes collected by all gear types, LCR 2002.

	SEX										SEXUAL CHARACTERISTIC						SEXUAL CHARACTERISTIC						
	Female					Male					Undetermined			Both color and tuberculate			Tuberculate			Both color and tuberculate			
	SEXUAL CHARACTERISTIC		Both color and tuberculate		Tuberculate	Undetermined	SEXUAL CHARACTERISTIC		Both color and tuberculate		Tuberculate	Undetermined	SEXUAL CHARACTERISTIC		Both color and tuberculate		Tuberculate	Undetermined	SEXUAL CHARACTERISTIC		Both color and tuberculate		
	Both color and tuberculate	Color	None	Tuberculate	Undetermined	Both color and tuberculate	Color	None	Tuberculate	Undetermined	Both color and tuberculate	Color	None	Both color and tuberculate	Color	None	Tuberculate	Undetermined	Both color and tuberculate	Color	None	Tuberculate	Undetermined
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
Black bullhead	1	2							7	7									2	280	2	1	
Bluehead sucker									5	1										3	3	3	
Channel catfish	11								1	15										58	58		
Common carp									1	3										4	531	1	
Fathead minnow	18		1	1					9	2										6	404	3	
Flannelmouth sucker	1	1																		2	12	2	
Humpback chub	2	9																		35	724	2	
Plains killifish																							
Rainbow trout		1																					
Red shiner	1																						
Speckled dace		4																					
Yellow bullhead																							

Table 9. Catch of humpback chub per 24 h of netting effort by date, LCR 2002. n = number of nets.

**Report**

Date	Mean	N	Std. Deviation
20-APR-2002	.2159	13	.41938
21-APR-2002	.4697	13	.78956
22-APR-2002	.8971	13	1.83747
23-APR-2002	.5724	13	.93672
24-APR-2002	1.4465	13	2.93328
25-APR-2002	1.4750	13	2.48880
26-APR-2002	.6860	13	.84745
27-APR-2002	1.3228	13	2.63167
28-APR-2002	1.3226	13	1.71983
29-APR-2002	1.6251	13	2.22870
30-APR-2002	.1300	13	.31727
01-MAY-2002	.4425	13	.58282
02-MAY-2002	1.6677	13	1.87247
03-MAY-2002	1.7043	13	1.57577
04-MAY-2002	1.7449	13	1.89657
05-MAY-2002	2.2905	13	2.56598
06-MAY-2002	.6207	13	.95102
07-MAY-2002	1.3718	13	2.37397
08-MAY-2002	.8128	13	1.21003
09-MAY-2002	1.2126	13	1.84615
10-MAY-2002	.9162	13	1.16058
11-MAY-2002	.3301	12	.64584
12-MAY-2002	.9665	13	1.11860
13-MAY-2002	1.2060	13	1.45564
14-MAY-2002	1.7899	13	2.11356
15-MAY-2002	1.8107	13	2.81084
16-MAY-2002	1.7754	13	1.83681
17-MAY-2002	1.8006	13	1.47437
18-MAY-2002	.8906	13	1.16972
Total	1.1580	376	1.76786

Table 10. Disposition of fishes by species, LCR monitoring 2002.

	Disposition			
	Dead Preserved	Dead Released	Released Alive	Total
Black bullhead	0	3	0	3
Bluehead sucker	1	13	285	299
Channel catfish	0	18	1	19
Common carp	0	4	0	4
Fathead minnow	4	41	47	92
Flannelmouth sucker	1	4	536	541
Humpback chub	0	1	429	430
Plains killifish	0	2	2	4
Rainbow trout	0	5	0	5
Red shiner	0	10	4	14
Speckled dace	0	4	759	763
Yellow bullhead	0	2	0	2
Total	6	107	2063	2365

Table 11. Flannelmouth sucker recapture summary.

**Flannelmouth sucker recapture summary LCR 2002.****Recapture information****Capture information:**

PIT tag	Recapture date	River mile	Total length	Capture date	River mile	River	Total length
1F08751351	08-May-02	119	543		6/13/1993	8.35LCR	246
1F08751351.	.	.	.		6/14/1993	8.34LCR	249
1F08751351.	.	.	.		8/13/1993	5.16LCR	273
1F0C723033	11-May-02	1045	528		3/17/1994	0.05LCR	347
1F0C723033.	.	.	.		6/4/1998	-4.1COR	496
1F3E573418	05-May-02	119	480		7/17/1994.	LCR	232
1F7777591A	14-May-02	100	520		6/15/1995	180.9COR	394
1F782B5E60	09-May-02	119	470		4/28/1997	1.12LCR	182
1F782B5E60.	.	.	.		4/11/1999	0.05LCR	356
1F782B5E60.	.	.	.		5/1/2001	4.9LCR	461
1F783B5B53	08-May-02	119	490		5/2/1997	0.41LCR	189
1F783B5B53.	.	.	.		5/10/1997	1.12LCR	193
1F7A285E61	14-May-02	119	462		6/23/1995	0.03KAN	325
1F7A38307F	04-May-02	119	500		4/29/1998	0LCR	422
1F7A38307F.	.	.	.		8/1/2001	59.15COR	513
1F7A38307F.	.	.	.		8/29/2001	58.5COR	506
1F7B4B7625	09-May-02	119	526		4/26/1996	0.17LCR	255
4127252521	30-Apr-02	100	479		6/28/1998	0.08HAV	330
4127252521.	.	.	.		8/3/2001	62.2COR	459
416A74652A	06-May-02	119	410		9/24/2000	142.8COR	361
416B187F6F	13-May-02	1045	295		5/9/2001	1.5LCR	231
416B562F35	10-May-02	119	455		5/9/2001	0.12LCR	430
4174766L2F	03-May-02	100	510	X (No record in database)			
42144F684E	09-May-02	119	478		6/21/1998	61.8COR	348
423C677455	17-May-02	119	465		8/2/2001	62.7COR	480
423D263609	12-May-02	1045	192	X (No record in database)			
423D414604	04-May-02	1160	180	X (No record in database)			
423D420C7C	29-Apr-02	577	221	X (No record in database)			
423D44642B	03-May-02	119	155	X (No record in database)			
423D505D53	06-May-02	1160	236	X (No record in database)			
423E591D7A	16-May-02	119	442		8/30/2001	61.45COR	442
423F016D40	01-May-02	119	296		8/3/2001	60.75COR	249
423F0C1A06	17-May-02	100	465		8/3/2001	60.75COR	474
423F0C1A06.	.	.	.		8/31/2001	61.2COR	468
42400E0729	17-May-02	119	321		6/6/2001	3.1LCR	244
4240150A1E	03-May-02	100	500		8/3/2001	61.2COR	499
42402A2B6D	24-Apr-02	119	242	X (No record in database)			
4240372F54	07-May-02	100	458		5/5/2001	-0.04LCR	440
42421F2E40	13-May-02	119	460		8/30/2001	61.4LCR	455
4242272D7B	28-Apr-02	119	352		6/5/2001	3.15LCR	303
4242394434	06-May-02	100	230		8/30/2001	60.3COR	189

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**Flannelmouth sucker recapture summary LCR 2002.**

**Recapture information**

**Capture information:**

42423E021C	27-Apr-02	137	255	6/8/2001	8.6LCR	135
42423E021C.				10/6/2001	8.7LCR	217
4242466A6D	28-Apr-02	1195	156	X (No record in database)		
4242485F15	08-May-02	1045	260	6/6/2001	3.82LCR	120
4242500A10	05-May-02	1195	191			
425C487F11	10-May-02	100	475	This fish was a double tag.		
4269483743	10-May-02	100	475	This fish was a double tag.		
426A75563D	29-Apr-02	100	243	11/12/2001	1.6LCR	200
426B1F392E	18-May-02	100	430	X (No record in database)		
426B345236	25-Apr-02	500	176	11/5/2001	3.14LCR	155
426B50162F	19-May-02	1195	176	X (No record in database)		
426B6D5575	17-May-02	119	232	11/8/2001	3.14LCR	201
426B78657C	09-May-02	119	399	X (No record in database)		
426C047ESD	12-May-02	480	200	X (No record in database)		
430F414A1A	02-May-02	119	220	11/9/2001	12.19LCR	192
430F4B6B0A	26-Apr-02	119	240	10/7/2001	1.3LCR	201
430F5B5E22	23-Apr-02	119	250	X (No record in database)		
430F753522	13-May-02	1160	229	10/5/2001	8.2LCR	197
4347133B04	03-May-02	480	230	10/6/2001	11.98LCR	185
4347392969	10-May-02	100	212	10/1/2001	6.9LCR	162
4347392969.				11/7/2001	6.9LCR	179
43473C7855	18-May-02	137	243	10/6/2001	11.98LCR	212
434742416B	23-Apr-02	1195	207	10/10/2001	6LCR	168
5112370E38	07-May-02	100	470	X (No record in database)		
5116042A75	13-May-02	119	502	5/17/1999	0.07LCR	488
5116042A75.				6/11/2000	50.7COR	497
51160F5942	07-May-02	100	390	5/3/2000	0.05KAN	289
51160F5942.				9/24/2000	142.6COR	351
53202E5344	07-May-02	100	400	4/18/2000.	LCR	211
53251C0367	09-May-02	100	480	8/17/2000	143.1COR	472
53251C0367.				6/12/2001	0LCR	475
532523326	06-May-02	675	425	X (No record in database)		
5325573666	08-May-02	119	480	9/15/2000	63.1COR	480
53263C1E62	02-May-02	1195	421	5/3/2000	0.05KAN	337
532646360D	07-May-02	100	450	8/18/2000	143.5COR	416
7F7A12395B	13-May-02	100	489	7/9/1994	0KAN	392
7F7A12395B.				6/23/1995	0.03KAN	423
7F7B183468	19-May-02	119	482	8/17/1994	9.54LCR	258
7F7B183468.				6/17/1998	0.05LCR	455
7F7B1A4845	10-May-02	100	500	4/16/1994	0KAN	315
7F7B1A4845.				3/2/1996	0LCR	443
7F7B1A4845.				5/8/1999	0PAR	480
7F7D080056	10-May-02	577	555	7/12/1992	60.4COR	515
7f7D17437A	07-May-02	119	529	X (No record in database)		
7F7D222D12	08-May-02	119	485	X (No record in database)		
7F7D7F490C	08-May-02	119	536	5/16/1994.	LCR	500
7F7D7F490C.				1/16/1995	2.48LCR	499

**Flannelmouth sucker recapture summary LCR 2002.**

<b>Recapture information</b>	<b>Capture information:</b>		
7F7D7F490C.		4/13/1995	2.52LCR

Flannelmouth sucker recapture summary:

Number captured earlier in Colorado River	20
Number captured earlier in LCR	41
Number captured earlier in Kanab Creek	6
Number captured earlier in Paria River	1
Number with no original capture record	19

Table 12. Humpback chub recapture summary.

**Humpback chub recapture summary, LCR 2002.**

PITTAG	RECAPTURE INFORMATION			CAPTURE INFORMATION		
	Recapture date	River mile	Total length	Capture date	Total length	River mile
1F0F630966	15-May-02	165	362		1-Sep-01	361 COR
1F0F630966					17-May-93	280 LCR
1F0F630966					31-Aug-01	362 COR
1F1E487506	06-May-02	1195	385		17-Sep-93	357 COR
1F1E487506					19-Apr-95	350 LCR
1F1E487506					9-May-01	366 LCR
1F1E487506					2-Aug-01	380 COR
1F204F353D	05-May-02	119	430		16-Mar-94	418 LCR
1F3C1E7E09	28-Apr-02	100	360		14-May-94	327 LCR
1F46703972	17-May-02	100	395		17-Jan-94	389 LCR
1F46714664	06-May-02	100	360		18-Mar-94	343 LCR
1F7A364071	28-Apr-02	100	384		4-Aug-01	387 COR
1F7A364071					18-Sep-97	356 COR
1F7A364071					18-Sep-97	365 COR
4169010C24	03-May-02	480	210		1-May-01	158 LCR
423C3A7623	11-May-02	675	110	X (No record in database)		
423C637D3C	30-Apr-02	1110	147		7-Oct-01	130 LCR
423D437030	04-May-02	1045	151	X (No record in database)		
423D477505	03-May-02	1045	113	X (No record in database)		
423F01132C	29-Apr-02	100	156	X (No record in database)		
423F043945	05-May-02	1160	195		10-Jun-01	186 LCR
423F0B3B59	25-Apr-02	137	229		31-Aug-01	225 COR
423F0B3B59					7-Jun-01	221 LCR
42401D6924	30-Apr-02	119	146	X (No record in database)		
42401F7C04	04-May-02	1195	105	X (No record in database)		
42402E5B65	28-Apr-02	119	235	X (No record in database)		
424222285A	26-Apr-02	1160	111	X (No record in database)		
42422C0023	30-Apr-02	100	112	X (No record in database)		
4242307B41	03-May-02	165	113	X (No record in database)		
4242335F2B	28-Apr-02	100	132	X (No record in database)		
42424E4F00	30-Apr-02	100	112	X (No record in database)		
426C04261C	18-May-02	1195	168	X (No record in database)		
426C6E600D	07-May-02	675	158	X (No record in database)		
426C705103	09-May-02	100	193	X (No record in database)		
426D260940	06-May-02	100	195	X (No record in database)		
426E380B37	18-May-02	1110	164	X (No record in database)		
4347222E2C	18-May-02	420	299		6-Oct-01	300 LCR
4347284319	23-Apr-02	100	119	X (No record in database)		
510A7A0937	04-May-02	100	145	X (No record in database)		

**Humpback chub recapture summary, LCR 2002.**

<b>PITTAG</b>	<b>RECAPTURE INFORMATION</b>			<b>CAPTURE INFORMATION</b>		
	<b>Recapture date</b>	<b>River mile</b>	<b>Total length</b>	<b>Capture date</b>	<b>Total length</b>	<b>River mile</b>
532122371B	15-May-02	1045	282	19-Apr-00	255 LCR	14.34
5326362C1B	08-May-02	119	256	21-Apr-00	193 LCR	14.05
7F7B035F34	15-May-02	100	399	20-Apr-93	376 LCR	.
7F7D076556	23-Apr-02	100	403	31-Aug-01	400 COR	60.1
7F7D076556	.	.	.	15-Jul-91	396 COR	60.3
7F7D173755	30-Apr-02	119	386	26-Jul-91	235 LCR	3.8
7F7D173755	.	.	.	31-Jul-91	231 LCR	3.1
7F7D173755	.	.	.	11-May-94	298 LCR	1.6
7F7D176816	15-May-02	165	382	10-May-97	355 LCR	0.1
7F7D176816	.	.	.	8-May-91	262 LCR	0.1
7F7D176816	.	.	.	23-Jul-91	278 LCR	0.21
7F7D176816	.	.	.	21-Mar-95	334 LCR	0
7F7D176816	.	.	.	19-Apr-95	335 LCR	2.86
7F7D180574	03-May-02	119	382	17-May-94	320 LCR	9.86
7F7D180574	.	.	.	17-Jun-91	245 LCR	9.1
7F7D180574	.	.	.	17-Jun-92	283 LCR	10.83
7F7D180574	.	.	.	18-Jun-92	282 LCR	10.83
7F7D180574	.	.	.	10-Aug-93	320 LCR	5.84
7F7D181E74	27-Apr-02	577	390	9-May-01	401 LCR	1.6
7F7D181E74	.	.	.	3-Jun-91	353 LCR	1.05
7F7D181E74	.	.	.	22-Apr-92	353 LCR	6.13
7F7D181E74	.	.	.	17-Mar-93	366 COR	63.08
7F7D181E74	.	.	.	28-Mar-93	357 LCR	0.14
7F7D181E74	.	.	.	14-May-93	358 LCR	1.55
7F7D181E74	.	.	.	1-May-96	375 LCR	0.2
7F7D237B49	15-May-02	165	342	16-Jun-92	248 LCR	8.02
7F7D237B49	.	.	.	2-Aug-01	347 COR	62
7F7D2B322D	28-Apr-02	100	389	27-Mar-93	394 LCR	9.9
7F7D2B322D	.	.	.	16-Apr-95	392 LCR	10.12
7F7D2B322D	.	.	.	6-May-01	387 LCR	1.75
7F7D300E0E	18-May-02	100	410	8-May-93	390 LCR	1.05
7F7D7C3613	04-May-02	119	368	2-May-98	349 LCR	3.1
7F7D7C3613	.	.	.	24-Mar-93	305 LCR	0.06
7F7D7C3613	.	.	.	2-Mar-95	326 LCR	0.4
7F7F113535	07-May-02	119	348	9-Nov-91	255 COR	60.4
7F7F113535	.	.	.	31-Mar-92	255 LCR	0.39
7F7F113535	.	.	.	28-Apr-92	256 LCR	1.59
7F7F113535	.	.	.	6-Mar-95	288 LCR	0.04
7F7F113535	.	.	.	27-Mar-95	290 LCR	1.32
7F7F173525	06-May-02	119	400	19-Apr-93	361 LCR	.
7F7F173525	.	.	.	30-Mar-92	364 LCR	6.13
7F7F173525	.	.	.	19-Apr-95	370 LCR	6.5

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Humpback chub recapture summary, LCR 2002.

PITTAG	RECAPTURE INFORMATION			CAPTURE INFORMATION			
	Recapture date	River mile	Total length	Capture date	Total length	River mile	
7F7F27287D	06-May-02	119	370		16-Jun-92	322 LCR	6.13
7F7F27287D	.	.	.		23-Apr-92	317 LCR	6.29
7F7F27287D	.	.	.		19-May-95	345 LCR	5.44
7F7F27287D	.	.	.		15-Nov-00	373 LCR	2.6
7F7F33057E	28-Apr-02	100	394		28-Mar-92	344 LCR	2.5
7F7F33057E	.	.	.		17-May-94	355 LCR	1.16
7F7F33057E	.	.	.		20-Jun-96	351 COR	61.26
7F7F331E1D	23-Apr-02	100	396		14-May-93	359 COR	61.4
7F7F331E1D	.	.	.		16-Feb-93	361 LCR	0.39
7F7F331E1D	.	.	.		4-Apr-98	371 LCR	0
7F7F331E1D	.	.	.		19-Apr-99	386 LCR	0.48
7F7F391A47	12-May-02	100	425		31-Aug-01	430 COR	60.85
7F7F391A47	.	.	.		21-May-92	265 LCR	0.88
7F7F391A47	.	.	.		20-Jun-97	387 COR	62.6
7F7F394A23	18-May-02	119	436		15-Jan-93	404 COR	60.5
7F7F394A23	.	.	.		24-Apr-92	404 LCR	3
7F7F394A23	.	.	.		8-Mar-93	408 LCR	1.62
7F7F3F4A56	06-May-02	100	350		11-Mar-91	284 COR	61.4
7F7F3F4A56	.	.	.		11-Mar-92	313 LCR	1.25
7F7F3F4A56	.	.	.		24-Mar-93	305 LCR	0.06
7F7F7E5F50	28-Apr-02	100	405		10-May-93	392 LCR	3.02
7F7F7E5F50	.	.	.		25-Apr-92	391 LCR	3.1
7F7F7E5F50	.	.	.		23-Jun-92	393 LCR	.
7F7F7E5F50	.	.	.		12-May-93	390 LCR	3.17

Humpback chub recapture summary:

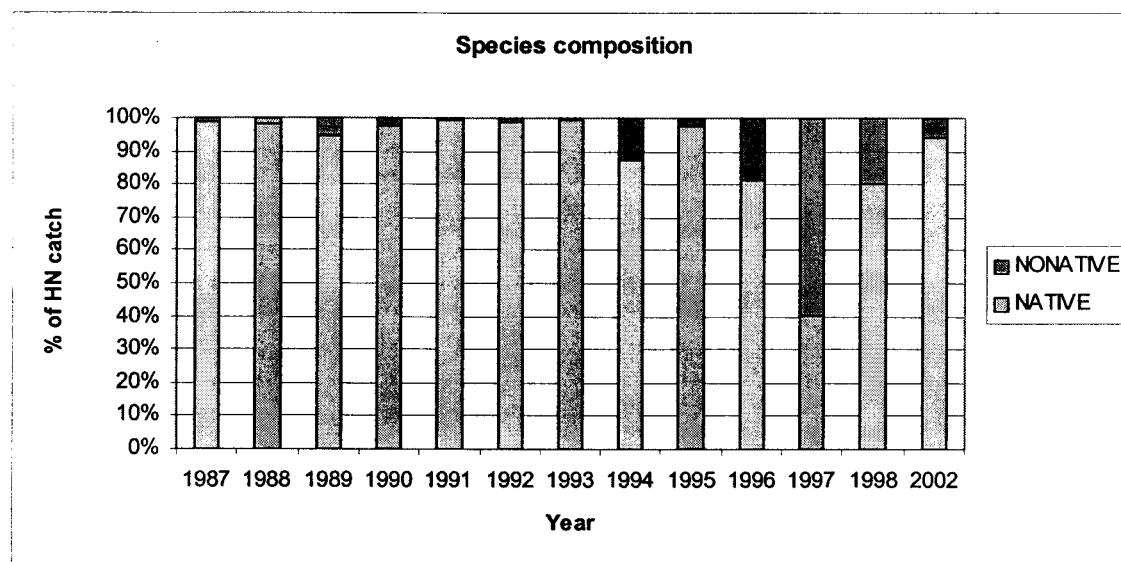
Number captured earlier in Colorado River only	2
Number captured earlier in LCR only	20
Number captured earlier in both Colorado River and LCR	11

Table 13. Bluehead sucker recapture summary.

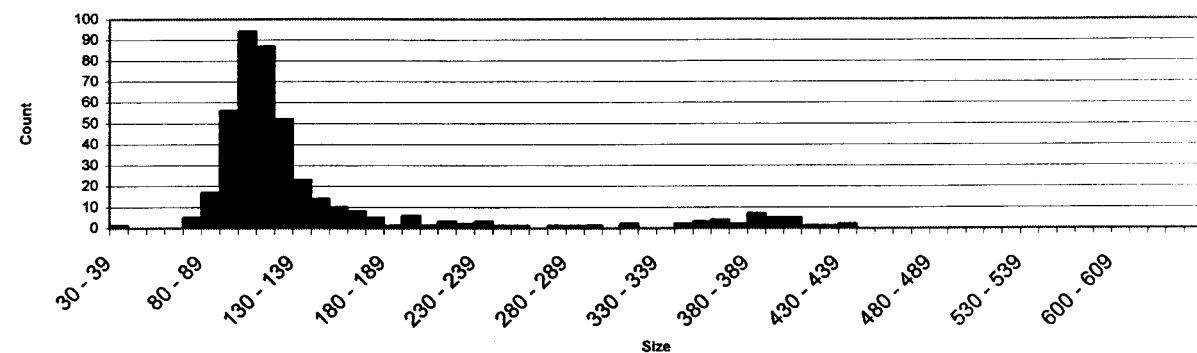
**Bluehead sucker recapture summary LCR 2002.**

Recapture information			Capture information:				
PIT tag date	Recapture date	River mile	Total length	Capture date	River mile	River	Total length
426B2B603B	14-May-02	1195	211	13-May-02	577	LCR	212

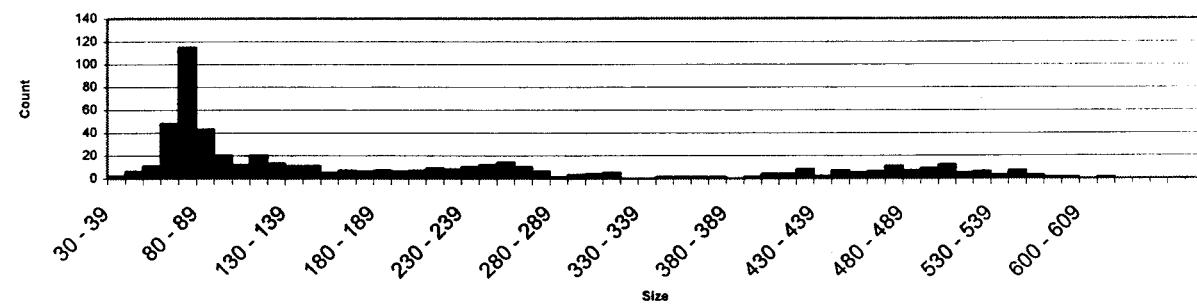
Figure 1. Species composition of standardized hoop net monitoring catches, 1987 - 2002.



**HBC**



**FMS**



**BHS**

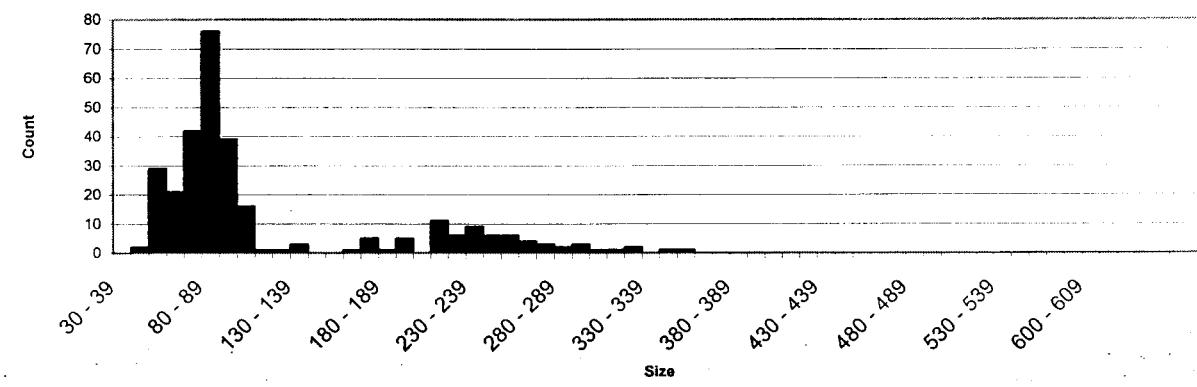


Figure 2. Length frequency distributions of humpback chub (HBC), flannelmouth sucker (FMS) and bluehead sucker (BHS), LCR monitoring 2002.

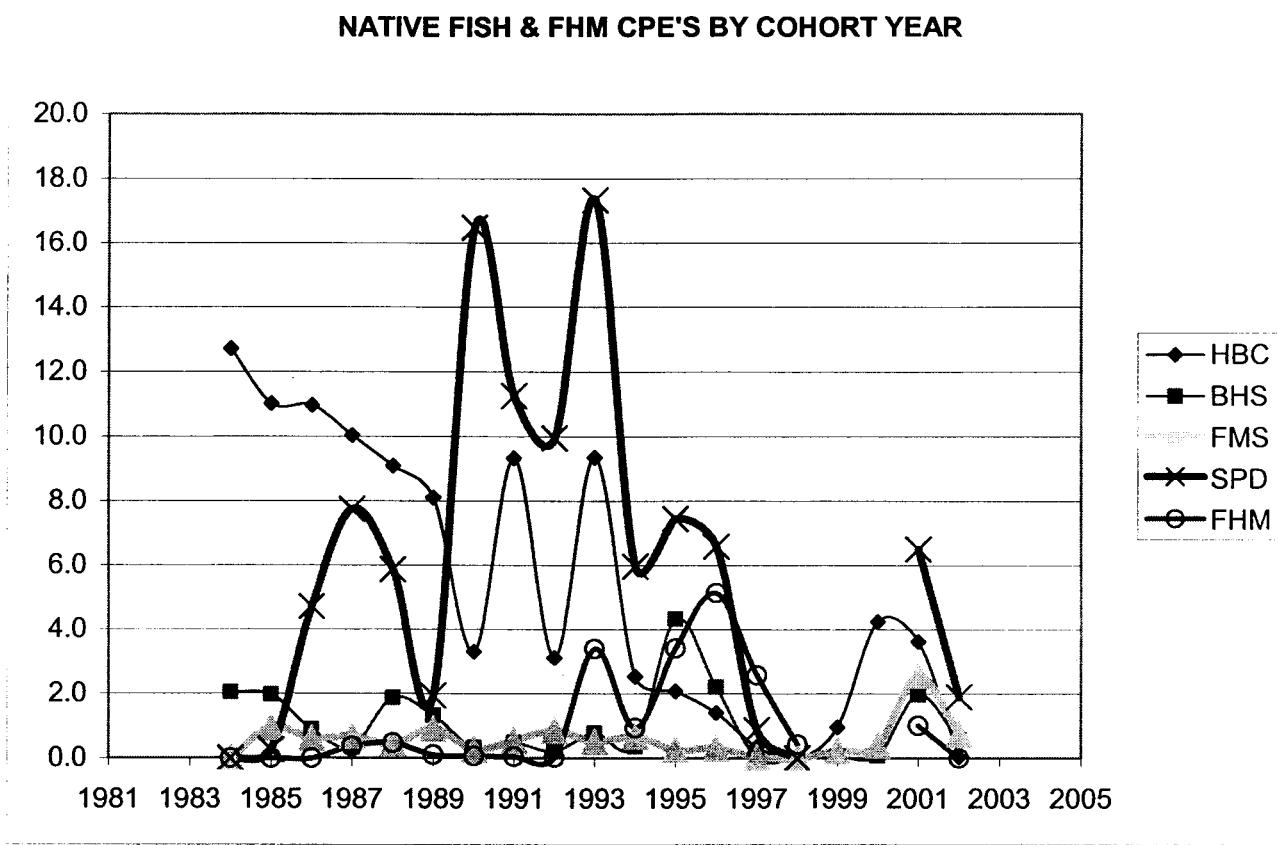


Figure 3. Native fish and fathead minnow catch/10 net hours by cohort year.

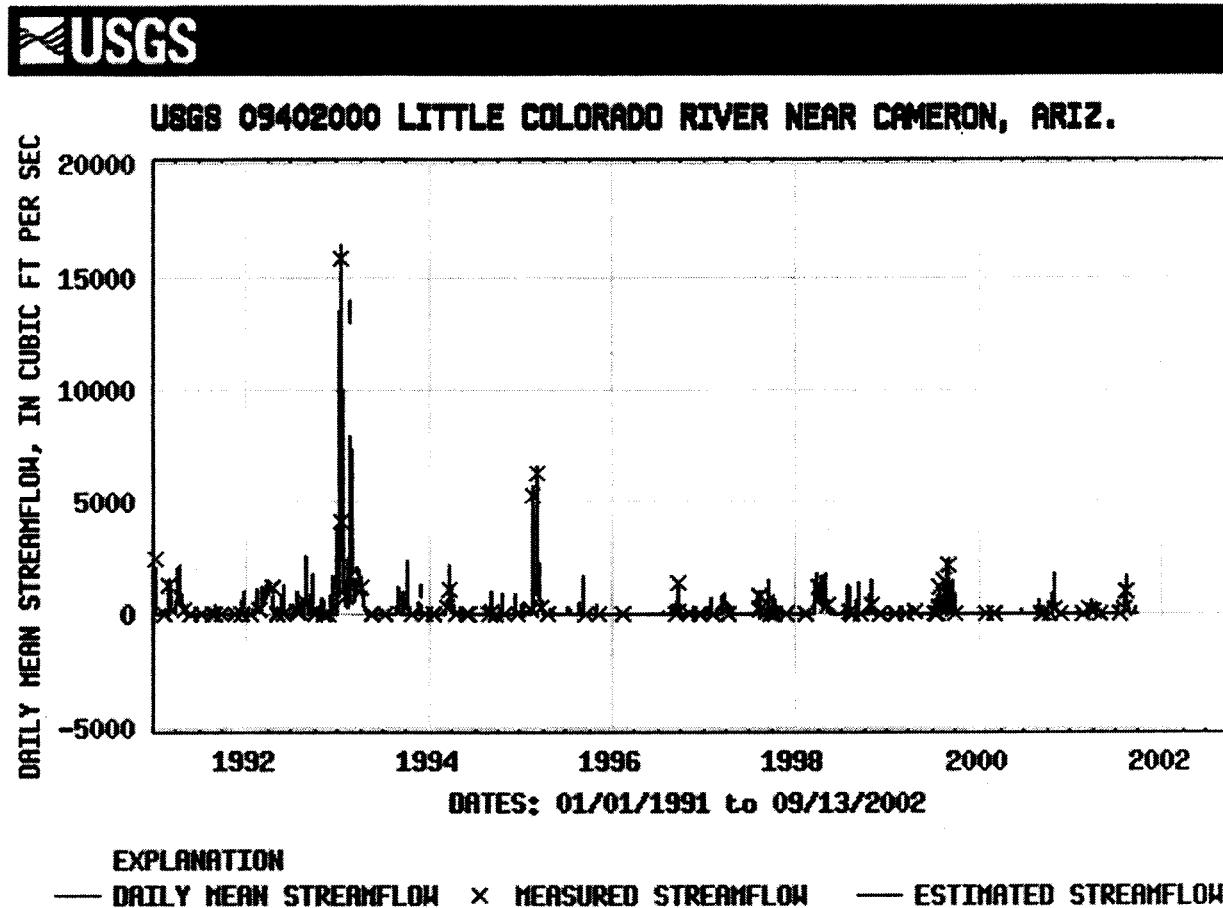


Figure 4. Daily mean streamflow, Little Colorado River near Cameron Arizona.

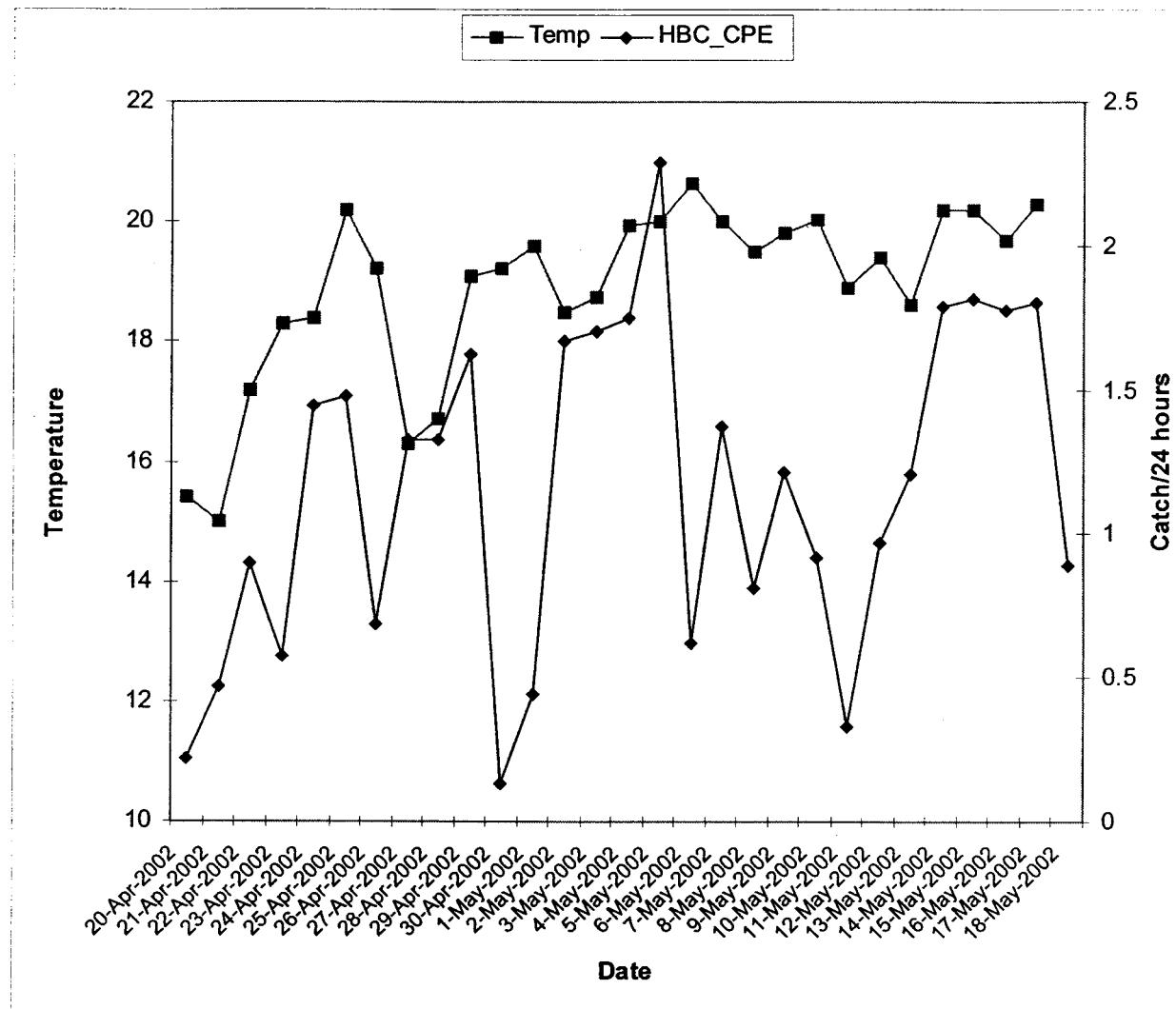


Figure 5. Mean daily water temperature and catch per effort of humpback chub, LCR 2002.

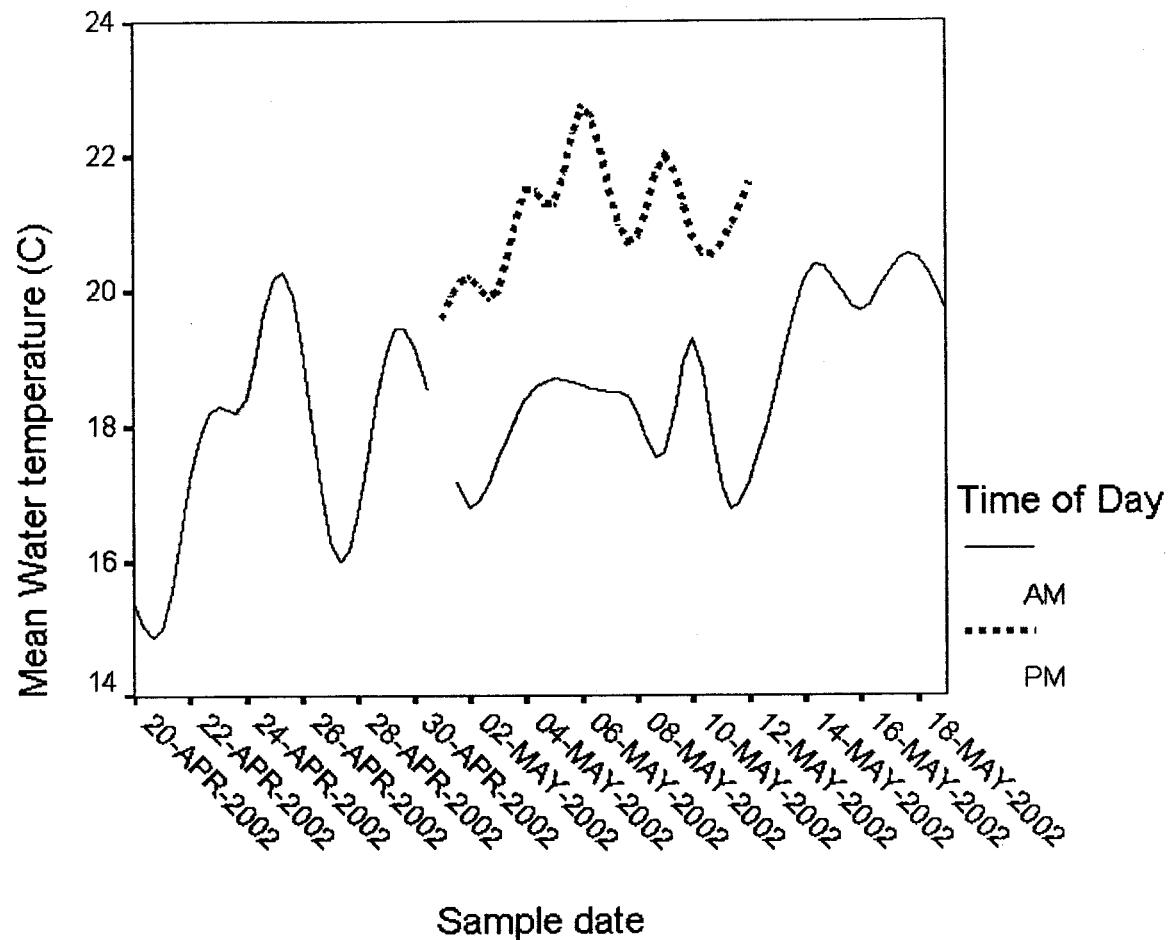


Figure 6. Daily water temperature (C), at Boulder camp, Little Colorado River 2002.

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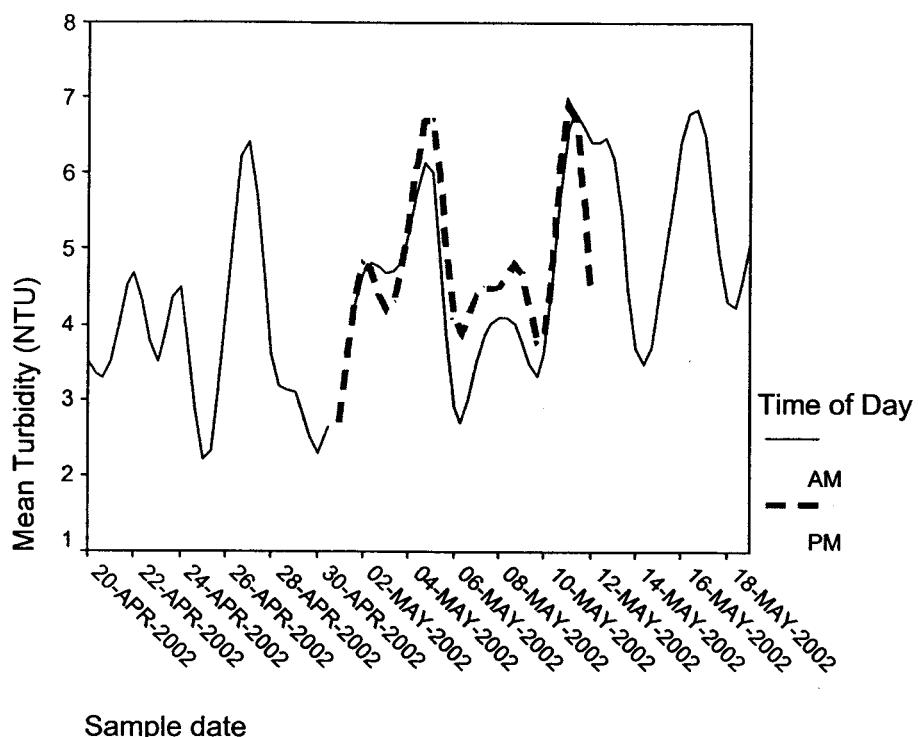


Figure 7. Turbidity (NTU), at Boulder camp, LCR 2002.